

Breaking from Colonial Institutions: Haiti's Idle Land, 1928-1950

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PRELIMINARY AND INCOMPLETE

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Abstract

A strange puzzle in Haiti's economic history is that labor migrated abroad even though there was a lot of idle land at home. I argue the land was idle because two historical land institutions turned Haiti into a landholdings checkerboard. Land redistribution divided the land among the population, and a ban on foreign ownership of property prevented early investors from aggregating the land. After a century, the people had spread over the land and developed a complex property rights system that imposed large transaction costs on acquiring land. To look at the checkerboard's role, I collect new data on land adopted under a government rental program; I observe over 5,700 plots adopted over 22 years, unprecedented data for Haiti. Combining the data with a transaction costs model, I test predictions on land adoption. The results are consistent with large transaction costs to acquiring land. Furthermore, I look at the Dominican Republic's and Jamaica's histories to provide more evidence. The historical institutions' effect on current development shows that countries breaking away from colonial institutions might still implement institutions that decrease long-run development.

Haiti is the poorest country in the Western hemisphere, and it has been in a poor position for a long time. Haiti was poor in the 19th century, but its performance was not drastically different from other Caribbean countries (Bulmer-Thomas 2012). At the turn of the century, however, a great divergence began. There are no credible national income estimates for Haiti in the early 20th century, but exports per capita in the Dominican Republic, Haiti's eastern neighbor, compared to Haiti in the 1930s were 2.5 to 3.0 times higher. Income trends in the second half of the 1900s show that other low-income countries grew but Haiti's economy remained stagnant and even shrank (Maddison). Haiti has failed to achieve the convergence that economic theory expects.

In understanding why Haiti has not experienced convergence, I investigate a puzzle in its economic history: in the early 20th century, Haitian labor was very mobile and migrated to foreign agricultural operations, but at the same time Haiti had lots of idle, fertile land. Although migration flow estimates are rough, approximately 20% of the prime-age male workforce worked outside of Haiti. But about 600,000 hectares of land sat unused. Why did labor leave instead of cultivating the idle land? Haiti's dominant cash crop was coffee, which could be profitably farmed on small land. The farms that demanded its labor, however, were large-scale sugar operations that could take advantage of scale economies and pay higher wages. High international wages drove migration, but Haitians could have raised their own productivity by cultivating more of the land available at home. What prevented them from using this land?

I argue that Haiti's post-independence property rights institutions prevented farmers from cultivating the land. There are two institutions in particular. First, after gaining independence, the Haitian government redistributed land to the entire population, and the property owners passed the land to their descendants. Every generation divided the land among heirs, and all descendants retained a veto right on alienating the property. Second, the 1805 constitution banned foreigners from owning property, and the government strictly enforced this ban until the U.S. occupation removed it in 1918.

These two institutions combined to divide Haiti's land into a checkerboard and prevented large-scale farms from emerging. Haitian farmers had spread across the land, making it difficult to find large, contiguous properties to cultivate. The property rights institutions prevented investors from resolving the problem through bargaining. Investors in the 19th century could have possibly maintained enough contiguous land to support profitable farms by negotiating with individual farmers. But by the time the ban was lifted, native farmers with complex property rights had spread across the land, and convincing even a single operation to transfer land was difficult. Even though Haiti's factor endowments were favorable to sugar cultivation, getting the land to farm it was difficult.

These property rights institutions differed significantly from the Dominican Republic. Haiti reacted to the threat of foreign invasion by banning foreigners from owning land; the Dominican Republic reacted to the threat by opening its land to foreigners. The DR made several attempts to annex itself to other countries, and in the process it created a welcoming environment to foreign investment. In the late 19th century, it was an open frontier, and investors saw the opportunity to buy vast tracts of land. The DR was a late-comer in producing sugar, but through foreign investment it quickly played a prominent role.

I investigate the role of Haiti's land institutions using new data I collected from a government land rental program. During the U.S. occupation, American officials wanted to increase revenues from State-owned lands. They reformed a land rental program and effected a minor redistribution. I am able to observe all idle land farmers adopted under this program, constituting more than 5,700 agricultural plots over 22 years. Microdata on land in Haiti is difficult to obtain, and this much is unprecedented.

With the data I am able to generate three important stylized facts. First, under favorable rental conditions, land adoption is low. Over 22 years, farmers adopted less than 20,000 hectares, a small amount compared to what was available. Second, farmers adopt small plots. Even though there were no restrictions on plot size, the median plot is between one and two hectares. Finally, farmers could have adopted more land but chose not to. I find

that around 46% of plots are bordered by idle land, meaning the farmer could have expanded the plot but did not. These stylized facts deepen the idle land puzzle, and any answer must also explain them.

I model the effect of property rights institutions on land adoption. The model has two countries (North and South) and two sectors (subsistence farming and large-scale). In the large-scale sector, farmers can take advantage of economies of scale. Labor can flow between countries and sectors. There are two key features of the model. First, when labor moves, it must pay a migration cost. This assumption is common when modelling labor mobility, but I specifically include it because I can perform empirical tests on the comparative statics when migration costs change. Second, the South has institutions that increase the costs of obtaining land for large-scale farming.

The model's equilibrium matches the stylized facts found in my data. The high land costs in the South prevent investors from establishing a large-scale farming sector. Because the North has large-scale farming, there is a productivity difference between the two countries. Labor moves from South to North, but migration costs prevent the productivity gap from closing. Land is idle in the South because subsistence farmers cannot profitably adopt it.

I can test the model using an exogenous change in migration costs induced by the 1937 Trujillo massacre. In 1937, the Dominican Army slaughtered Haitians living in the DR, greatly increasing the risk of migrating and therefore the cost. Under the model, if migration costs increase, then labor will move to the South, and farmers will adopt more land. My data confirm that land adoption increased significantly after the massacre, especially in areas that received a labor supply shock from refugees.

The post-massacre adoption patterns show that the institutions forced the land to be idle. In the absence of the costly land institutions, we would expect investors to take advantage of the cheaper labor and start large-scale farms. If barriers to land aggregation exist, however, then the adopted land will all be in the subsistence sector. Consistent with the presence of

barriers, I find that the land adopted after the massacre is entirely subsistence-sized plots.

This paper contributes to the literature on pre-colonial and colonial institutions' effects on long-term development. Colonial institutions have played a significant role on long-run development, even when the colonial period ended long ago (see Acemoglu et al. 2001, Dell 2010, Michalopoulos and Papaioannou 2016). More recently, research has shown that pre-colonial institutions influenced development paths (see Michalopoulos and Papaioannou 2013). The conclusion from both these research strands is that institutions are hard to change and have long-lasting effects. This paper shows that in key moments, such as after a revolution, the fixed costs of changing colonial institutions can be lower and the country can make big institutional changes. However, it also shows that these big changes may also cause even worse long-run outcomes.

1 High Labor Mobility and Idle Land Puzzle

In the early 20th century, Haitian labor was very mobile. Migrant laborers went to two countries in particular: the Dominican Republic and Cuba. The Dominican Republic was the largest source of demand, but Cuba was not inconsequential. Estimates for flows to the DR are imprecise because the porous border allowed uninhibited migration. But several estimates put the flows at about 100,000 seasonal migrants (State Department 838.56/1). Our understanding of the flows to Cuba are better because migrants travelled by boats, which are easier to track and tax. Between 10,000 and 25,000 migrants a year traveled to Cuba legally, but, because some laborers could circumvent migration fees by taking unofficial boats, the true flows were higher (State Department 838.504/5). Although many of these laborers migrated on a seasonal basis, some stayed in the destination country.

This high degree of mobility caused labor shortage problems in Haiti. If total migration flows were 100,000 per year (a conservative estimate given the estimated flows to DR and Cuba) then foreign countries employed about 20% of Haiti's prime-age (25-55) male work-

force. The workers' absence did not go unnoticed. Newspaper reports claimed that many villages had lost a substantial amount of productivity to these plantations (Le Temps, Oct 1927). For instance, the American High Commissioner to Haiti reported that in Aux Cayes, the fourth most populous commune in the country, male labor was detrimentally scarce (State Department 838.504). Not only was the stock of labor diminished, but the quality decreased as well. Recruiting agents for the United Fruit Company performed physicals and selected the strongest labor to come to Cuba.

International wages drove migration flows. In the Dominican Republic, wages were twice as high as they were in rural Haiti, and immigration costs were low (State Department 838.56/1). To migrate to Cuba, the sugar companies paid all of the upfront migration costs—travel, passport, and a bond for each laborer to insure the migrant's return. These costs were not trivial—the United Fruit Company spent more than \$100,000 annually on 5,000 men. Even with the high migration costs, Haitians working in Cuba could get wages six times as large as the rural Haitian wage. Furthermore, the workers could purchase clothing from the company store at one third to one half the price of clothing in Haiti, which means the real wage was even higher (cite Cuba stuff).

At the same time as these high migration flows and high international wages, Haiti had lots of idle land available. Reports across several decades mention the bounty of idle land. At the beginning of the occupation, the State owned approximately 1.5 million hectares, about half of the country's area, but most of it was unoccupied and uncultivated (Millspaugh 1929). Shortly after the American troops withdrew from Haiti, Americans still in the country noted that one of the principal problems facing the government was inducing owners of idle land to put it into production (Annual Report). Years later, Brisson (1968) concluded that large landowners, including the State, must own about 624,000 hectares, of which only 7% was under cultivation.

Furthermore, much of this land was quality agricultural property. Certainly some of the land was unfit for production (Lundahl 1996, Millspaugh 1929), but much of it was fertile.

The State had originally acquired the land when it confiscated the French plantations during the Haitian Revolution (Trouillot, 1990; Millspaugh, 1929). At the time, half of the world's coffee and sugar came from the plantations on this land, so we know the land at one point was used productively. Furthermore, the land sat fallow for 100 years, allowing it regain its fertility (Annual Report 1926-27 pp 137; Annual Report 1931-32 pp 28; Millspaugh 1929).

Indeed, compared to the land under cultivation, the idle land was particularly attractive. Peasants across generations had exhausted the privately held land. Indeed, the government at one point ran a land exchange program (Renaud, 1934), where farmers could redeem state-owned land in exchange for privately-owned land. The program was so popular that it had to be shut down because of the adverse selection problems it created (Annual Reports 1940) But at least some farmers were willing to forfeit property they owned to obtain the high-quality land owned by the state.

These two facts lead to a puzzle in Haitian economic history: with so much idle land available, why did so much labor move abroad? Wages drove migration, and Haitian labor was more productive abroad than it was at home. Yet, Haitian farmers could have increased their productivity by expanding production into the idle land. In fact, expanding domestic production would save migration costs and avoid the harsh working conditions abroad.

This puzzle is not a construction of the modern economic historian; contemporary observers found it perplexing too. Legislators justified a law attempting to reduce migration by noting that migration was removing agriculturalists from Haiti even though there was sufficient unused land to provide employment to all (State Department 838.504). In discussing internal revenues, officials noted that emigration taxes supplied a large source of revenue, but the government could earn even more revenue if it could find a way to employ the migrant labor on the idle domestic land (Annual Report 1931). There was fertile, idle land even in areas with high levels of emigration (Casey 2012).

2 Land Institutions after Independence

The small farms and idle land puzzle can only be understood in the context of agriculture's prominent role. Since colonial times, export agriculture has dominated the Haitian economy. At its peak, on the eve of the Haitian Revolution, the colony was the world's largest sugar and coffee supplier. Although its position in the world economy vanished after the revolution, the agricultural legacy persisted into the 20th century. Figure 1 displays the composition of exports from 1916 to 1924. When the American Occupation arrived, around 60% of Haiti's exports came from coffee, and by 1924 the share had grown to 80%. Other agricultural exports included sugar, cacao, and cotton, and the primary natural resource export was hardwoods such as logwood and lignum vitae, which contributed to Haiti's infamous deforestation. Non-agricultural exports made up about 20% of export revenue. Agriculture was the primary source of economic activity, making it a natural target for reforms.

Agriculture was the main source of employment. In the 1950 census, of the economically active population, 86% of laborers were directly engaged in agriculture. Within agriculture, almost everyone worked within the home: in the average commune, 93% of laborers reported being an enterprise head or an unpaid family worker. Though the exact figures are uncertain, almost all families owned land.

If agriculture is such a big part of the Haitian economy, why do laborers leave the country instead of cultivating the available land? Below, I show that land remains idle because two institutions contributed to a checkerboard landholding pattern. The first institution was the government redistributing the land and farmers passing it down through inheritance, giving multiple generations rights to the same property. This institution created large transaction costs to acquiring land. The second institution, also implemented right after independence, was a ban on foreigners owning property. This institution prevented investors from aggregating land before farmers spread all over it and transaction costs became too high. These institutions differed from the Dominican Republic and had large effects on development.

2.1 Land Redistribution and Inheritance

When discussing the causes of Haiti's small-scale agriculture, Lundahl (1996) claims that the land tenure system is the "most important mechanism". After the Haitian revolution, the government and masses took the land formerly cultivated under the plantation system and redistributed it. This redistribution left little room for the elites to exploit, and in their quest for rents they moved out of agriculture and into urban centers. The elite's exodus from agriculture and competition for political rents pushed agricultural property rights protection far down the priority list. As Lundahl (1996) puts it, "In comparison to the problem of staying in power, illegal squatting was a very minor issue." Instead of relying on a formal title system, farmers developed an informal tenure system.

The informal property rights institutions contributed to small farms because they were dominated by a partible inheritance system. Haitian property owners divided their land equally among heirs (Bastien). Each heir received usufructuary rights over the inherited land, but alienation rights were held by all heirs. Thus, if a farmer wanted to sell his plot, he had to receive approval from all of his siblings and even cousins. And the joint claim on the land impedes aggregation because obtaining more land requires expending large transaction costs convincing all members of the family to alienate it. Indeed, some believe this practice was explicitly designed as a device to commit future generations to remain on small farms and prevent large-scale agriculture from returning and destroying the lives the early revolutionaries fought to create (DuBois).

2.2 Foreign Ownership Ban

Fearing foreign powers would reassert control over their newly independent nation, the Haitian founding fathers prohibited foreigners from owning land. The 1805 constitution, the first one passed after declaring independence, explicitly banned foreigners of any nation from acquiring property in Haiti. It also put all former French properties into the States' hands. In 1807, Haiti split into the Kingdom of Haiti in the north and the Republic of Haiti

in the south, but both retained retained the ban in their constitutions (Janvier 1886).

The government strictly enforced this ban. Even when outsiders attempted to circumvent the law, the government managed to stop them. For example, an 1860 law specified that in a marriage between a foreign man and a Haitian woman, only the wife could purchase and hold property (Janvier 1886). Merchants exploited this loophole and acquired property through their new Haitian wives, but this strategy soon become popular enough to worry the government. The 1879 constitution stripped women married to foreigners of their Haitian citizenship, required them to sell any property within three months of the marriage, and forbade them from acquiring property in the future; in the event of the husband's death, the woman could only regain her citizenship and property rights if the couple had no children (Dubois 2012, Janvier 1886).

The US eliminated the interdiction at the beginning of the occupation, but its enforcement combined with 100 years of land redistribution and population growth cemented the agricultural organization. Without the foreign property ownership ban, a deep-pocketed investor might have purchased large tracts before subsistence farmers captured them. But because the government enforced the ban, a century of Haitian population growth populated the land. Once the ban was removed, investors could not purchase land without dispossessing farmers.

2.3 Evidence that landholdings were scattered

The State owned a significant amount of the country's land, but the land redistribution, partible inheritance, and foreign ownership ban combined to create a checkerboard of private and public holdings. To obtain enough contiguous land to participate in export agriculture, investors would have to either negotiate with hundreds of farmers or evict them. In his discussion of this problem, Lundahl (1979) concludes that it is hard to understand how much it affected Haitian agriculture, but it probably was not as important as factor endowments and market conditions. I contend that it had a significant impact.

Haiti's population density alone indicates that it must have been difficult to find large stretches of uninhabited land. In 1920, the US estimated there were 1.6 million people living in Haiti's area of 27,750 km². If the population was randomly scattered over the country, there would be one person every 1.69 hectares. Accounting for urbanization and suitable agricultural land hardly affects this figure¹.

Even though the population density makes it look like there is no idle land, the agricultural organization and cultivations practices created tracts of idle land. Households are not randomly scattered across the country; they gather together in family units and jointly cultivate. Furthermore, the median household cultivates between 1 and 2 hectares, and because the median household size is four, each person is occupying only 0.3 hectares of cultivated land. The preponderance of small, clustered agricultural units would create large tracts of idle land.

Although there were large tracts of idle land, it is unlikely that an investor could find enough contiguous, idle land to make a purchase without transacting with multiple farmers. Suppose there are 10 households cultivating next to each other; these households would consist of 40 people cultivating about 15 hectares. Given the population density, there are 68 hectares for these 40 people, but because they cultivate only 15, there are 53 hectares sitting idle somewhere. If the idle land was located immediately around this cluster, then an investor could get 53 hectares without negotiating with anyone but the State; however, to expand any further he would immediately have to contract with 40. Thus, there could be nonlinear and even convex costs to acquiring large tracts of land.

Attempts in the early 20th century to establish large-scale agriculture show that obtaining large tracts of land required either contracting with hundreds of farmers or evicting them. For the Standard Fruit company to secure about 800 hectares for banana farming, the company had to contract with hundreds of small farmers. Some farmers refused to contract with

¹12% of the population lived in urban areas and exerted little pressure on the agricultural land. On the other hand, it is extreme to assume the whole country was suitable for agriculture. Using the FAO estimates cited in Brisson (1968), there is 2.3 million hectares of suitable agricultural land, pasture, and forests. Thus, the figure only changes to 1.63 hectares per person.

Standard Fruit, and because the company was farming around them, property rights disputes naturally arose (Hubert, in Lundahl 1979 pp 286). The government granted a few thousand acres to other companies, but to claim them the companies had to evict thousands of tenants. Indeed, the eviction process was so costly that there is no evidence the companies cultivated the land (Castor and Casey). Furthermore, the state had little power to evict farmers. US officials complained that the government needed to reform their eminent domain law to make eviction easier (Annual Report 1938, pp 99). In some cases where the state tried to seize land, farmers were able to bring their claims to court and successfully defend their rights (Annual Report 1928 pp74), or at least cause costly delays (Casey pp 85).

Advertisements for available state land also demonstrate the difficulty of finding contiguous plots. In 1934, the government placed a full-page announcement in *Le Moniteur* describing tracts of land available for rent in five communes throughout the country. Only one advertised plot was larger than 1000 hectares, and it was bordered on the north and west by the ocean shore, indicating that a significant portion of it was unfit for agriculture. There were some in the 100 hectare range, but it also contained advertisements for many less than 10 hectares. In fact, it even advertised one that was only 1.38 hectares. If the state held large, contiguous tracts of land, it would not bother to announce such small parcels.

2.4 DR Property Rights

Property right institutions in the Dominican Republic were different than Haiti, and the difference extends back to colonial times. While Haiti was an extremely productive agricultural colony, the Dominican Republic, then Santo Domingo, was a peripheral colony in Spain's empire. The Spanish held rich colonies in the Americas, abundant in minerals and labor, where they could easily extract wealth. The DR did not fit in this colonial model, and it hosted a small population dedicated mostly to cattle raising. Unlike Haiti, it was not a major destination for plantations or slave labor.

After the DR gained independence from Spain, Haiti immediately conquered it, and

property rights were one of the government's central issues. Less than three months after the Dominican Republic declared independence from Spain in November 1821, Haiti, acting on fears of a French invasion through the newly independent state, in February 1822, conquered the entire island of Hispaniola. Upon arrival, the Haitians found the Dominican property rights system—where land titles were more like shares, a system well-suited to cattle raising but not plantation agriculture—cumbersome and inefficient. The reforms they pushed were contentious and caused problems up until their expulsion in 1844 (Moya Pons 1985).

Fearing Haiti might invade again, the DR opened itself to foreigners, ushering in the development of large-scale agriculture. In the second half of the 19th century, Dominicans worried that Haitians would return. The threat pushed them to seek protection from foreign powers. The Dominican Republic voluntarily returned to being a Spanish colony in 1861—the only Latin American country to do so after gaining independence—but then declared independence in 1865 (Sagas 1994). Next, Dominicans tried to persuade the United States to annex it. The effort ultimately failed, but the government had already made large land concessions to Americans Pinkett (1941). The DR maintained its openness to foreigners, and by the end of the century investors were buying large tracts of land on the Dominican frontier, demanding clear property rights and receiving preferential treatment (Martinez 1999, Moya Pons 1985). Thus, both countries feared foreign invasions, but they reacted in opposite ways and generated completely different institutions.

The institutional differences between the two countries can be seen in their different land distributions. Haiti has a relatively egalitarian land distribution, but the Dominican Republic, like many other Latin American countries, exhibits high inequality. Figure 2 displays the percentage of cultivated land in 1971 in both countries that is done on small (less than 5 ha) and large (greater than 50 ha) farms. In Haiti, 86% of cultivated land is on small farms, and less than 1% is on large; the Dominican Republic, on the other hand, cultivates only 13% of its land on small farms and 55% on large. The countries have two completely different agricultural structures determined by their different land institutions.

3 Occupation, Reforms, and Data

To understand the data used in this paper, it is essential to understand the political environment, which was dominated by the U.S. occupation. In 1914, U.S. Marines extended its Caribbean strategy and began occupying Haiti. The Caribbean was a key commercial and military location because of the Panama Canal and the islands' strategic positions. To protect US interests, the military secured nearly every major territory in the region. In the early 20th century, the U.S. was present in Cuba, Puerto Rico, Nicaragua, the Dominican Republic, and Haiti. Haiti was an especially important location because of its strong German presence and its chronic political instability (Heinl 1996).

The initial strategy was to leave quickly, but the occupation lasted until 1934 because of fears for the island's safety if the U.S. withdrew too soon. After World War I, the U.S. reevaluated its position in Haiti. Germany was no longer a major threat, and the occupation was not popular at home. Yet the grassroots Haitian resistance forces, after their initial defeat, were rising again and causing problems for the American soldiers. Officials believed that withdrawing without establishing stronger institutions would leave the island in chaos (Schmidt 1971).

To promote stability, the Occupation leaders began reforming government policies, focusing on Progressive principles. Schmidt (1971) argues that the U.S. leaders extended the Progressive movement and implemented technocratic reforms to eliminate corruption and improve efficiency. Many reforms were effective and greatly reduced corruption; even U.S. firms had trouble gaining special privileges (Millspaugh 1929, Schmidt 1971). Officials set their agenda based on resolving the next inefficiency.

One of the largest inefficiencies was the government's near inability to derive revenue from internal sources. The government relied almost exclusively on customs receipts for its revenues, and the new office of the Financial Adviser sought to decrease this dependency. From 1911 to 1915, over 97% of government revenue came from customs receipts. The dependency decreased after the U.S. entered, but even in 1926 customs still comprised 86%

of revenues. A study published at the time, cited by the Financial Adviser's report, claimed Haiti was the country most dependent on customs receipts; its reliance far exceeded the next two highest: Salvador (66%) and the Dominican Republic (50%). Because customs receipts are so volatile, the Financial Adviser sought to increase revenue from internal sources, and he believed the government could achieve this goal through land (Annual Report).

Although land was the country's principal source of wealth, the officials knew there would be barriers to deriving greater revenue from it. Haiti had no land tax and, more importantly, no cadaster to indicate who even owned land. But the State owned land, and a lot of it was idle. Instead of instituting radical, divisive new programs, the American officials decided to reform an old one.

3.1 Land rental program

Since 1877, the government had made land available to rent, but it administered the program poorly. The program fell under the jurisdiction of multiple departments, both holding information critical to the other's roles. Prices were set by the law and did not vary across the country. Local administrators had trouble collecting rents from tenants, and because of the poor administration it was often confusing as to who was renting from the State and who was not.

The rental program became the the Progressive American officials' target. The Americans were interested in eliminating inefficiencies, and this program was rife with them. As one official said, "It would be hard to devise a system more susceptible to fraud or more difficult to administer properly" (Annual Report 1924-25, pp 119). Not only would reforming it fit the Progressive principles of correcting inefficiencies, but it also fit into the larger policy agenda. They wanted to increase internal revenues, and they saw land as the best means to achieve that goal. Improving a program already in place seemed like the best approach.

In 1927, they passed a reform with three key components. First, it consolidated the program under one department. Instead of one department in charge of registration and

another in charge of collection, administration fell under a single department. This consolidation eliminated coordination issues and allowed the department for the first time to analyze collections data and monitor the program's administration.

Second, the reform allowed rents to reflect market values. The prior law set rents the same for the whole country, meaning a property in the populous capital Port-au-Prince cost the same as a property in the isolated rural areas of Camp Perrin. These price distortions affected rental adoption and rental revenues. Under the reform, rents would be determined by information from local markets. After receiving a request for land, the local administrators office would dispatch a surveyor to appraise the property. The surveyor was instructed to account for the land's quality and compare it to similar properties available in local markets. After the surveyor determined the property's market value, by law the rent was 6% of the appraised value.

The set rate appears to have been chosen so as to subsidize plot rentals. One of the program administrators wrote that reformers chose the rate explicitly to be lower than market mortgage rates (Millsbaugh 1929). Farmers looking to acquire property in the market might need to finance it with a mortgage with a 10% annual interest rate, for example. The State's goal was to present another option to acquire land at a lower rate, making the State's program more attractive. Other evidence from a survey in 1950 indicates that this rate was possibly half of the expected annual cost of land.

The reform's third key component was to make the tenant the residual claimant for investments made on the land. By law, once the government appraised the land and set rent for a new contract, as long as the farmer paid, the rent was fixed for 10 years. After the initial decade, the government could reappraise the plot and set a new rent, but the reappraisal could not account for any improvements the farmer had made. The surveyor had to imagine the farmer had never rented the plot and assess this counterfactual plot's value on the current market; essentially preventing inflation from eroding the government's revenue. After 20 years, or any time a new tenant took the land, the law allowed the government to

fully reappraise the plot and capitalize the improvements. Thus, while the tenant did not formally own the land, the law protected his cultivation rights and made him the residual claimant on any investments.

After the reform, public land rental revenues increased. Initially, the increases came because of improvements in the program's administration. In Figure 3 I plot some of the statistics reported by the financial adviser. In 3a we can see that the number of tenants jumped significantly from 1927 to 1928, but for the next four years the number of tenants stayed flat. The jump after the reform comes from better record keeping, not from additional tenants. But in 3b we can see the total rent due to the State increases throughout the period. Because the number of tenants is flat through this period, the additional rent due must come from reappraising rents on plots already in the program. Even though rent due increased, 3c shows that the amount collected stayed flat until 1933. This increase came both from more tenants renting from the State and more tenants paying their rents. Although the program was not an immediate success, the reforms were effective.

In addressing the idle land and mobile labor puzzle, I am interested in land adoption patterns under this program. Below I describe data I collected on idle land adoption.

3.2 Land adoption notifications

The land rental law required the government to publish a notification every time land was adopted under the program for the first time. Publishing notices of government action was not an unusual practice: Haiti is a civil law country. The government's official publication, *Le Moniteur*, was dedicated to regularly publishing government decisions. *Le Moniteur* mainly published laws and presidential decrees, but one can also find notices that affect only one person, such as citizenship declarations or check cancellations. The rental program published land rental notifications in *Le Moniteur*, almost always on the last page, and kept the announcement in the paper for at least three months.

Notifications appeared only when land was adopted for the first time, which is beneficial

for a study on idle land. Every time a notification appears, I know that that piece of land was idle prior to the publication. Moreover, because notifications only appear the first time land is rented, I do not have to worry about double counting land. .

I have collected the universe of notifications published from 1927 to 1950. Farmers adopted 5,792 agricultural plots during this period. Every notification lists the first date it was published, which allows me to explore gaps to confirm there are no missing notifications. Because all notifications are published for at least three months, I can use multiple issues to double check notifications and avoid missing data that might result from damaged or missing issues.

Each announcement contained key descriptive information about the land being adopted. Haiti's government was divided into 105 administrative communes, and the notification listed the commune where the plot was located. The announcement also described the plot's size and the neighbors—i.e. what was located on the north, south, east, and west side of the plot—to facilitate locating it. Finally, it also listed the renter's name and the date he or she requested the land.

The data show that the total land adopted was small compared to what was available. The nearly 5,800 plots together constitute about 19,400 hectares. Compared to the nearly 600,000 hectares Brisson (1968) calculated were available just in four out of the five administrative departments, this is hardly noticeable. Furthermore, for five communes we know from the 1934 advertisement mentioned earlier how much land was available. Because this is a single advertisement, and assuming more land is made available in other years, we can take it as a lower bound estimate of available land. However, when I calculate how much land was adopted in these communes over the entire period, as shown in Table 1, we see that in only one commune does the total land adopted exceed the lower bound estimate of available land. Despite the government's efforts to induce farmers to cultivate the idle land, farmers adopted little.

The descriptive statistics show that most adopted land was small. Figure 4 shows the

distribution of plot sizes, and we can see it is clearly unimodal at the low end. The median plot was 1.29 hectares, which is exactly 1 *carreaux*, the Haitian standard unit of land area. Nevertheless, we observe a full range of plot sizes, even into the hundreds of hectares. The law did not dictate or put limits on plot sizes; the distribution demonstrates confirms there were no legal limits on size, but the preference for small plots indicates that other constraints existed.

The descriptions show that farmers were not choosing small plots because they had no room to expand; in fact, some farmers could have chosen larger plots but did not. Often the notification say there is idle land next to the adopted plot. For instance, it might say Pauleon has adopted on hectare, and on the south border is Ulysse cultivating state-owned land; but on the north border is unoccupied state-owned land. Thus Pauleon could have adopted more land to the north, but chose to adopt only one hectare. In fact, 15% of plots have at least one neighbor listed as “unoccupied state land,” and 31% of plots have at least one neighbor listed as “rest of the land” or simply “the State,” both indications that the land was idle. Together this means that 46% of renters had the opportunity to choose larger plots but did not.

The descriptions also provide evidence for the checkerboard pattern of state and private holdings. The descriptions often designate whether the bordering land is owned by the state or not. If we assume the notification always explicitly says when the neighboring plot is owned by the state, then 67% of plots have at least one neighbor not owned by the state. This assumption is problematic since the writer might assume that the reader knows the state owns the surrounding land. A more conservative estimate looks just at how many plots have at least one neighbor owned by the state and at least one neighbor not owned by the state. In this case, 48% of plots are bordered by private and state land.

4 Model

There are two countries, North and South, where production occurs. Each country has a representative household endowed with labor (E_i^L), where i indicates North (N) or South (S). The household labor endowment is equal in both countries ($E_N^L = E_S^L$). To cultivate land, the household must pay a per unit cost R_i , which consists of the cost of clearing and establishing property rights on the plot (r_i) and rents from competition between the two sectors. The land endowment (E^T) of both countries is the same.

The economy has two sectors: a subsistence sector and a large-scale sector. The subsistence sector uses land and labor to produce an agricultural output using a production function $F(L, T)$. The large-scale sector also uses land and labor, but it must use a minimum amount of land T_{min} to take advantage of the production function $AF(L, T)$, where $A > 1$.

Labor can move across borders. If labor moves to the other country, then it incurs a per unit migration cost $c > 0$. This cost includes all costs involved with working in the other country, including travel, safety risks, and living away from home.

In the South, there is an institutional cost to acquiring land. I model this institutional constraint using an additional cost δ per unit of land. This cost represents the bargaining costs associated with convincing all parties to exchange land, which I assume is constant for each unit of land. Hence, the cost of employing land T requires $r_s T$ to clear the land and δT to acquire it.

Checkerboard Assumption: The cost δ is high enough such that

$$Af_T(E_S^L, T_{min}) < r_S + \delta.$$

This assumption means that even if the large-scale farm could employ all of the household's labor on the minimum amount of land needed to benefit from scale economies, the marginal product of land would not exceed the cost.

4.1 Equilibrium Characterization

First note that labor will flow from the South to the North. In a world of only subsistence, the marginal product of labor in the North is higher than in the South because the institutional land cost in the South makes farms smaller. When a large-scale farm enters the North, and not the South, the marginal product of labor increases even more. The productivity gap between the two countries will cause South labor to head North.

In the North, the household and large-scale farm will maximize profits. The household solves

$$\max_{L_N^H, T_N^H} F(L_{NO}, T_{NO}) + w_N(E_N^L - L_{NO}) - R_N T_{NO}.$$

The large-scale farm also maximizes profits:

$$\max_{L_N^P, T_N^P} AF(L_{NP}, T_{NP}) - w_N L_{NP} - R_N T_{NP}.$$

The South household faces a different decision where it chooses to allocate labor to the subsistence farm and to the Northern labor market. But when it works in the Northern labor market, it must pay the migration cost c . Hence, the South household's problem is

$$\max_{L_{SO}, T_{SO}} F(L_{SO}, T_{SO}) + (w_N - c)(E_S^L - L_{SO}) - (r + \delta)T_{SO}.$$

There are seven equilibrium conditions: the subsistence farms in both countries maximize profits, the large-scale farm in the North maximizes profits, and the labor market clears. Hence, the allocations must satisfy

$$f_L(L_{NO}, T_{NO}) = w_N$$

$$f_T(L_{NO}, T_{NO}) = R_N$$

$$Af_L(L_{NP}, T_{NP}) = w_N$$

$$Af_T(L_{NP}, T_{NP}) = R_N$$

$$f_L(L_{SO}, T_{SO}) = w_N - c$$

$$f_T(L_{SO}, T_{SO}) = r + \delta$$

$$L_N^H + L_S^H + L_N^P = E_N^L + E_S^L.$$

The equilibrium has several important features. First, the marginal product of labor is higher in the North than in the the South. Southern labor must pay a migration cost to go to the North, and there is no large-scale farm in the South, so the productivity gap does not close. Thus the South will cultivate subsistence farms more intensively than in the North.

Second, there is idle land in the South. In the North, the subsistence and large-scale farms compete to cultivate all of the land. In the South, the costs of clearing land and bargaining for it prevent the entire land endowment from being used. Thus, even though the subsistence farm in the South could cultivate more land, the cost of cultivation exceeds the revenues.

4.2 Comparative Statics

The model allows me to perform comparative statics that I can take to the data. First, an increase in migration costs will increase land use in the South. An increase in migration costs will decrease the take-home pay for South labor working in the North; thus, more labor stays in the South. More labor on the subsistence farm will increase the marginal product of land, and therefore the household will acquire more land. Hence, increases in migration costs put more land into cultivation.

Similarly, an increase in the South's labor endowment will increase land use in the South. More labor in the South means the marginal product of land is higher, and the subsistence farm can be larger as a result.

Finally, a decrease in bargaining costs (δ) will increase land use on the South subsistence

farm but will not necessarily institute large-scale farms. For the subsistence farm, a decrease in δ reduces the marginal cost of land. Thus, the household will adopt more into the subsistence farm. Because of the checkerboard assumption, a marginal decrease in δ will not affect large-scale farms. It would take a large decrease in δ to make large-scale farms profitable in the South.

5 Testing the Model

The model's comparative statics produce testable implications. I can put these implications to the data I collected from the land rental program to see if they hold. I can test the effects of a change in migration costs using the 1937 Trujillo massacre. Consistent with the model's predictions, land adoption increased after the massacre raised migration costs. The massacre's refugees let me look at a change in bargaining costs because they arrive with no land and no attachment to family holdings that might increase their costs of acquiring land. They deal with one party, the government, and their lower bargaining costs should lead to larger plots. Comparing the land size distribution of the refugees with the population as a whole shows that they indeed avoided the smallest plots.

Finally, I look at some historical examples to further explore the effect of transaction costs. I argue the ban on foreign property ownership was a small barrier to acquiring land than the cost of transacting with smallholders. Thus, removing the foreign ban once subsistence farmers have already spread should have little effect on large-scale agriculture. I show that the removal of the foreign ban in 1918 had little effect on agricultural organization. On the other hand, if the country had removed the ban earlier, before subsistence farmers could cover the land, then foreign investors could have purchased large plots without the transaction costs. Looking at Jamaica's history, which has a similar background but without a ban on foreign ownership, shows that the foreign ban had a significant historical effect.

5.1 Change in migration costs - Trujillo Massacre

I use an exogenous change in migration costs looking at the 1937 Trujillo massacre. In October 1937, Dominicans, sanctioned by their President Rafael Trujillo, slaughtered Haitians living in the DR. The exact number of deaths is unknown, and estimates vary widely; however, the most reasonable estimates count 12,000 deaths over a few days (Vega 1988). The massacre's effects were not limited to the island—it threatened foreign policy in many of the countries handling the aftermath (Roorda 1996). Indeed, the island still feels its effects today.

Nothing portended the massacre; for all involved it was unexpected. To be sure, the border was a source of contention between the two countries, but they used diplomacy to settle the dispute. A 1929 treaty established a commission to clarify the border, and in 1936 the countries decided on a clear border (Roorda 1996). The two countries achieved such a peaceful settlement that the two presidents received 14 nominations for a joint Nobel Peace Prize. Nothing indicated that a tremendous atrocity would follow a year later.

Furthermore, the massacre was unrelated to conditions in Haiti. When searching for what caused the massacre to happen in the Fall of 1937, a natural source is economic shocks. For example, U.S. officials at the time blamed low sugar prices and high Dominican unemployment (Annual Report 1937-38, pp78). But these reasons do not match the available evidence. First, the large decline in sugar prices occurred from 1929 to 1933, and in fact in 1937 sugar prices increased by 26% (Anuario Estadístico 1938 vol 2, pp 205). If sugar revenues were the problem, it is more likely that something would have occurred when sugar export values dropped by 65%, not when they were on the rise. Second, Trujillo was not trying to replace Haitian labor with Dominican labor; in fact, he tried to fill demand by recruiting labor from Puerto Rico (Roorda 1996). So far, no one has attributed the massacre to a credible economic cause. Indeed, the consensus is that the causes are unknown and possibly random. Hence, the massacre provides exogenous variation to examine the land market.

The massacre had two effects on the Haitian labor market. First, it increased the cost to Haitians of being in the DR. Any Haitian travelling to the DR now risked death. Surviving Haitians left the country in droves. The refugee influx was the first evidence the Haitian government received that something had gone wrong. Archival evidence reveals that in the first week alone at least 2,000 refugees entered Haiti at various points along the border. A good example of how this risk mapped directly into wages comes from attempts to recruit refugees to stay: the Haitian government sent buses to aid refugees leaving the country, and of the 2,000 passengers on one, sugar company recruiters convinced only three to stay (Vega 1988).

The data in the DR shows the extent of the increased risk to Haitian labor. In the 1935 Dominican Republic Census, the government counted almost 53,000 Haitians in the country, but in the 1950 Census the government found less than 19,000. Within 15 years, the DR lost 64% of its Haitian population: 34,000 individuals. The loss affected the entire country, but the border areas saw some of the largest losses. In Table 2 I disaggregate the inter-censal change by province. In the border provinces where the massacres were concentrated, the government in 1950 could find only 7 Haitians, whereas in the earlier census there were over 7,000. Even in the southern province of Barahona, where we have no reports of mass killings, almost 6,000 Haitians disappeared in the intercensal years. These numbers do not reflect the change in seasonal migration or the Haitians who would have gone to the DR but chose not to. The massacre caused a large change in migration costs.

The massacre's second effect was to create a large labor supply increase in Haitian border communes. Many refugees arrived injured and penniless, and the government was unprepared to receive them (Annual Report). It attempted to solve the problem by sanctioning refugee camps, called "agricultural colonies," where it could better coordinate aid and public goods. The government regularly received reports on the refugee camps (Monthly bulletin books). Although the government's investment in the refugee camps was short-lived (Lundahl 1979), the refugees stayed and could be found decades later (Derby).

The labor supply shock to the border communes was significant. As mentioned above, 34,000 Haitians disappeared between the 1935 and 1950 Dominican censuses. Taking the Vega (1988) estimate of 12,000 deaths, there would be 22,000 refugees. Using the 1950 population numbers, 22,000 migrants would constitute about 6% of the population in the border arrondissements, making the shock similar in size to the Mariel boatlift in Miami (Card, 1990).

The model predicts these two changes in the labor market will affect the land market. First, because migration costs increased for all Haitians, the demand for land in Haiti should have increased everywhere. Second, because part of the country received a larger labor supply shock, the border communes should have experienced an even larger increase in demand than the interior communes.

Examining how the land was adopted is a key indicator of the institutional barriers to large-scale farming. If there are no institutional barriers, then investors seeing the refugee influx should buy land and hire the unemployed labor. Indeed, these laborers were willing to migrate to the DR to work on large-scale farms, so they are exactly the kind of laborers the investor would want to hire. However, if there are institutional barriers to adopting large plots, then we would expect to see an increase in subsistence farming.

5.1.1 Regression

The first step is to test the effect of the international labor market using the massacre. The massacre had two effects. First, it eliminated a major source of demand for Haitian labor. This demand shock affected the whole country. Second, it pushed thousands of refugees into Haiti who mainly settled in the border regions. Therefore, I have variation in the massacre's effect across communes that I can use to test the model. By comparing the border and interior communes, shown in Figure 6, I can isolate the causal effect using a difference-in-differences analysis.

A key assumption for a difference-in-differences analysis is that the treatment and control

groups would have experienced parallel trends in the absence of treatment. Because assignment to border and interior is not random but could be correlated with many fundamentals, one might be concerned that the parallel trends assumption does not hold. However, a graphical analysis of the trends displayed in Figure 7 indicate that requests for land were nearly identical before 1938. Except for in 1934, the requests across the country follow similar trends. In the post-massacre period, however, the border communes experience a huge change and diverge from the interior communes. The graphical evidence is strongly in favor of a difference-in-differences approach.

The regression analysis confirms that the border communes experienced a large change after the massacre. As shown in Table 3, after the international labor market closed, the entire country experienced a 6.5% increase in land requests and 5.7% increase in area adopted. But the effect was four times larger in the border communes where refugees settled. These results are robust to including year and commune fixed effects.

One could be concerned that the change after the massacre could reflect a change in output prices that stimulated demand for land. To provide clearer evidence that the refugees caused the increase, I display the monthly land requests in Figure 8. The figure shows that there was no noticeable change until a few months after the massacre. This sudden change is consistent with an unexpected refugee shock.

The results confirm that an increase in migration costs increased land adoption, consistent with the model. These results show that labor mobility and idle land are causally connected: land was idle because labor had a high outside option.

The refugee results are also consistent with high transaction costs for acquiring land because the plots are so small. If there were no barriers to getting large tracts of land, then when the refugees returned you would expect an investor to buy lots of land and employ the refugees. Instead, the median plot adopted by refugees was only 1.29 hectares. Almost all of the labor was going to subsistence farming. Some investors tried establishing large-scale farms. In Table 4 I show how many large-scale plots (50 ha or more) were adopted before

and after the massacre in the interior and border communes. Only 51 large-scale farms were adopted at all, but 35 of them were after the massacre. Large-scale farming increased by a greater factor in border communes, but the numbers are so small it makes no sense to claim a significant difference. But investors did adopt large-scale farms when they could, and they did it more when more labor was available. But that so little was done indicates that there were significant constraints on the extent to which they could adopt large farms.

5.2 Refugees and Transaction Costs

Looking at the refugees' land size distribution gives insight on how transaction costs affect subsistence farms. The majority of farmers own their own land, and many received it through inheritance. These inherited plots might be very small, but acquiring more land can be costly because of the transaction costs. Thus, they apply more labor to the smaller plot. The refugees, on the other hand, do not have any land, and when they acquire it they deal with only one party, the government. When the refugees acquire land, it allows us to see what would happen in a world where no one owned land and could adopt it with much lower transaction costs.

The model predicts that lower transaction costs will lead to larger subsistence plots, which is what we see in the refugee plots. In Figure 9 I plot the refugee distribution against the total distribution found in the census. The refugee distribution is centered on plots between one and two hectares. Importantly, there are much fewer plots below one hectare than you see in the census distribution. This indicates that there are households in the population that would like to move from these small plots to a larger one in the one to two hectare range, but transaction costs prevent them. Transaction costs have an important effect on subsistence farmers.

5.3 Removing the Ban on Foreign Property Ownership

The next two sections move away from the land rental data and consider the foreign property ban's role on agricultural development. First, if the government removes the property ban after the population spreads over the land, the effect on agricultural development will be small. Once the checkerboard is established, the main source of transaction costs comes from dealing with the households spread over the land. Removing the foreign ban will change the pool of investors who could potentially purchase the property, but it does nothing to reduce the cost of contracting with individual parties. Because the change is marginal, we should not observe a change in large-scale production.

After removing the ban, there was little change in Haiti's agriculture. The government granted thousands of hectares to large corporations, but these tracts already had thousands of farmers on them. The state had little power to evict through eminent domain, and many farmers refused to move. We have no idea how much of the government granted land was actually put into production. Removing the ban was too late to affect agricultural organization.

5.4 Removing the Ban Earlier - Jamaica

Although the Dominican Republic is a good counterfactual for Haiti in many ways, it has its weaknesses. The clear advantage of using the DR is that it shares the island with Haiti, and therefore the two countries have similar factor endowments. On the other hand, they have very different histories, especially in their slavery experience. I have argued that their different histories demonstrate the importance of their different institutions given their similar factor endowments. But one might say that the differences are too great to provide a clear attribution to specific institutions. In particular, a country with a vivid legacy of slavery like Haiti could have fundamentally different environment than one without the legacy like the DR. If these fundamental differences play a large enough role, then ascribing a large effect to property rights institutions could be misleading.

To resolve concerns about the impact of slavery's residual impact, I also look at Jamaica as a counterfactual. Jamaica is located close to Haiti (about 120 miles at their closest points), and its factor endowments are also well-suited for cash crop cultivation. Importantly, it was also a major slave colony. Indeed, in the 18th century, Haiti (Saint Domingue) and Jamaica were both large sugar producers and slave demanders. The two countries had similar colonial economies, and they serve as good counterfactuals.

Like Haiti, Jamaica also experienced a shift to small-scale farming after emancipation. No longer bound to the land, the former slaves cultivated their own land. Instead of the government redistributing the plantation land, parties would pool resources and purchase entire plantations then divide the land. The freeholders chose similar plot sizes to their Haitian counterparts: the modal plot was between one and two hectares (Holt 1992). Decreasing sugar prices in the 19th century reinforced the decline of sugar plantations and the rise of smallholdings (Dippel et al. 2016).

The informal tenure system in Jamaica evolved in a similar way to Haiti. Jamaicans developed a tenure system called "family lands," where kinship groups shared ownership of property. All offspring had claim to the land, and no one could sell or subdivide it. Absentee family members do not lose their claim on the land. The complex tenure arrangements impede the land market (Stanfield et al. 2003).

But unlike Haiti, Jamaica could not ban foreigners from owning property. Emancipation did not remove Jamaica from the British Empire. Banning the British from owning land would have been impossible. Many British property owners left because the plantations' profitability decreased, but the option to buy property if it ever became profitable remained.

The inability to ban foreign ownership of land was a crucial factor in the return of large-scale agriculture in Jamaica. In the late 19th century, banana prices increased significantly. Banans became a valuable commodity, but farmers need to be able to quickly get their fruit to the market because it spoils so quickly after being harvested. Producers who monopolize shipping can lower production costs, and the lower costs lead to economies of scale on the

cultivation side. In Jamaica, foreign investors monopolized shipping, and then bought large tracts of land for banana plantations. The large plantations increased land prices, and smallholders sold their plots and worked on banana farms (Holt 1992). Large plantations returned to Jamaica, whereas in Haiti banana producers faced large transaction costs to establishing farms (Lundahl 1979).

6 Conclusion

Haiti's agricultural structure has a large effect on its poverty. This agricultural distribution is the result of institutions implemented after independence in 1804. Farmers could not establish large-scale farms because of the high transaction costs involved with acquiring land. Using new data I collected, I show that the transaction costs prevented investors from establishing large-scale agriculture, even when land and labor were available. I also show that transaction costs kept farmers on smaller plots from cultivating more land. Comparing Haiti's history to other Caribbean countries shows that the land institutions indeed played a large role in Haiti's underdevelopment.

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Table 1: Comparing Land Rented to Land Available

Departement	Commune	Available (1934)	Adopted (1928-1950)
Ouest	Croix-des-Bouquets	470	115
Nord	Fort Liberte	1593	1201
Ouest	Thomazeau	223	144
Ouest	Petionville	301	173
Ouest	Ganthier	168	549

Notes: All figures are in hectares. Available land comes from a 1934 advertisement. All years means 1928 to 1944.

Table 2: Distribution of Haitians in DR by Province, 1935 and 1950

Relative to Haiti	Province	1935	1950	Change	% Change
Border	Barahona	7327	1658	-5669	-77%
	Independencia	1491	648	-843	-57%
	Libertador	2444	1	-2443	-100%
	Montecristi	1372	2	-1370	-100%
	San Rafael	3442	4	-3438	-100%
Near Border	Bahoruco	9647	2989	-6658	-69%
	Benefactor	1785	20	-1765	-99%
	Puerto Plata	2313	226	-2087	-90%
	Santiago	1255	14	-1241	-99%
East	Azua	29	5	-24	-83%
	Distrito de Santo Domingo	928	1178	250	27%
	Duarte	278	8	-270	-97%
	El Seibo	7620	4667	-2953	-39%
	Espailat	112	0	-112	-100%
	La Altagracia	5514	3437	-2077	-38%
	La Vega	264	22	-242	-92%
	Samana	92	18	-74	-80%
	San Pedro de Macoris	6357	2702	-3655	-57%
	Trujillo	223	1167	944	423%
	Trujillo Valdez	167	6	-161	-96%
Total		52660	18772	-33888	-64%

Source: Anuario Estadístico de la República Dominicana 1938 V 1; República Dominicana Tercer Censo Nacional de Población 1950

Table 3: The Effect of Refugee Influx on Land Requests and Adoption

	Requests		Area Adopted	
	OLS	FE	OLS	FE
Post Massacre X Border	0.221*	0.221*	0.313*	0.313*
	[0.131]	[0.131]	[0.159]	[0.160]
Border	0.0288		0.0502	
	[0.0310]		[0.0591]	
Post Massacre	0.0649***		0.0566*	
	[0.0180]		[0.0329]	
N	1,768	1,768	1,768	1,768
R-squared	0.068	0.088	0.068	0.088

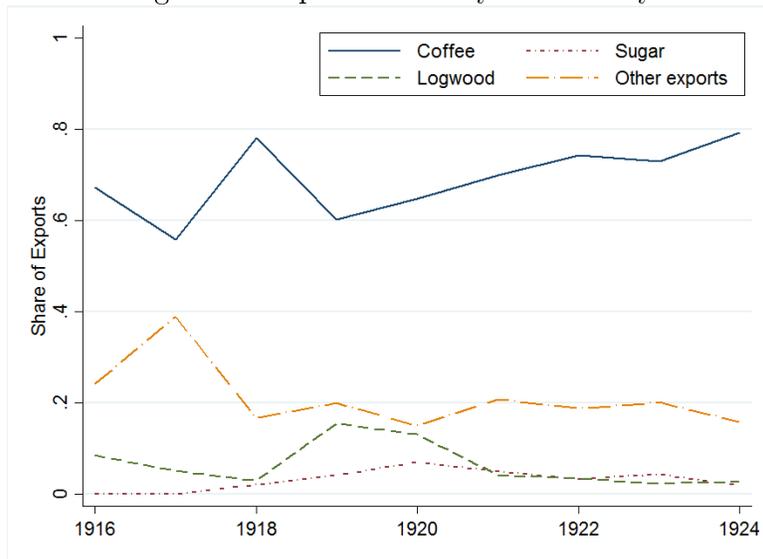
Notes: Dependent variable is the inverse hyperbolic sine of the requests and area adopted per capita; the coefficients are interpreted as percent changes. Standard errors clustered at the commune level.

Table 4: Number of large-scale farms adopted by massacre and border status

	Interior	Border
Before Massacre (1928-1937)	13	3
After Massacre (1938-1950)	26	9

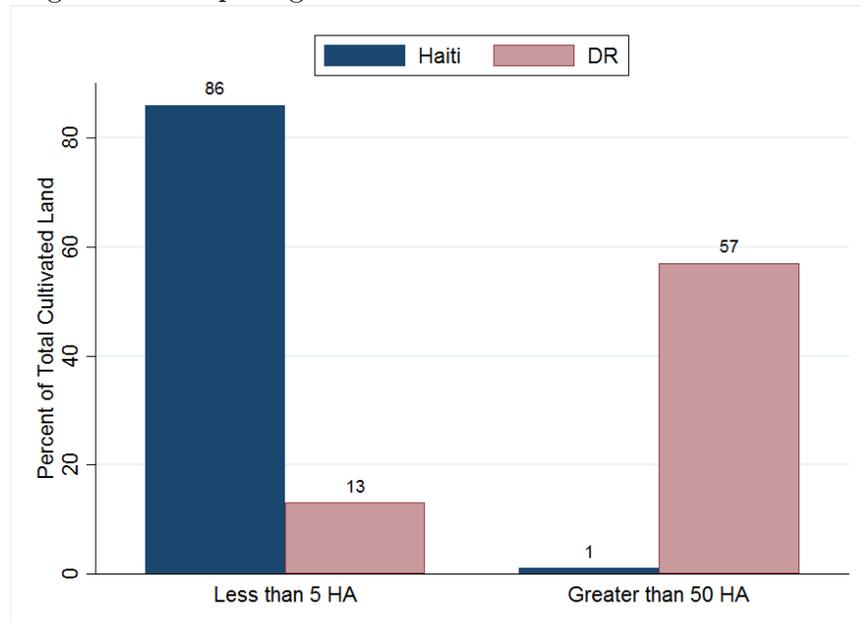
Notes: Large-scale is defined as greater than or equal to 50 hectares.

Figure 1: Export shares by commodity



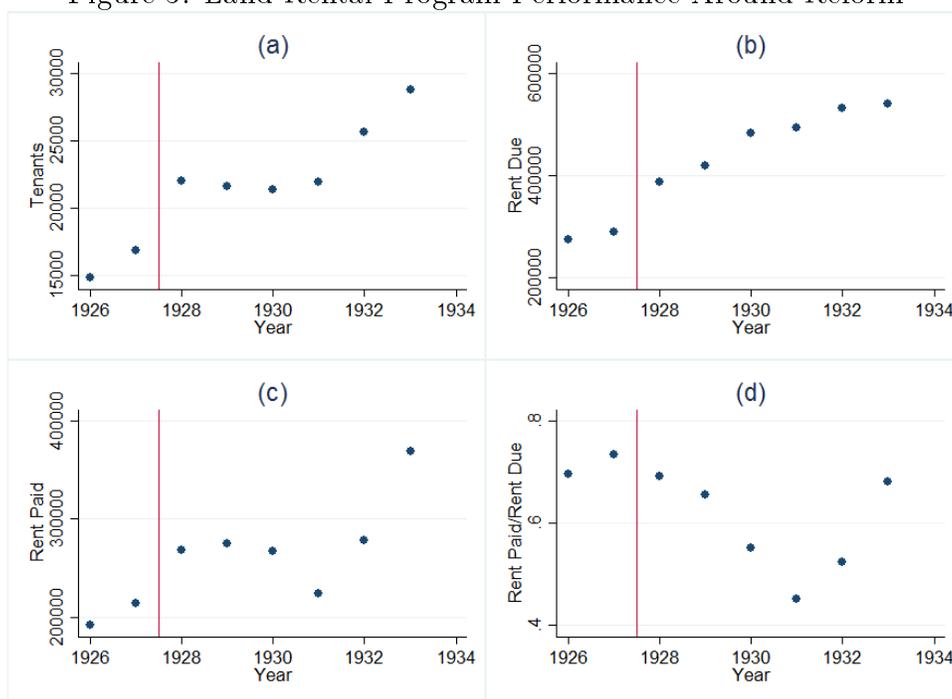
Source: Annual Report 1924-25. Table 17

Figure 2: Comparing distribution of land in Haiti and the DR



Notes: Figure gives the fraction of all cultivated land that occurs on each farm size.

Figure 3: Land Rental Program Performance Around Reform



Notes: (a) Number of tenants on state land. (b) Total rent due to the state. (c) Total rent collected. (d) Ratio of rent collected to rent due. Vertical red line indicates when the reform was passed.

Figure 4: Distribution of adopted plot size

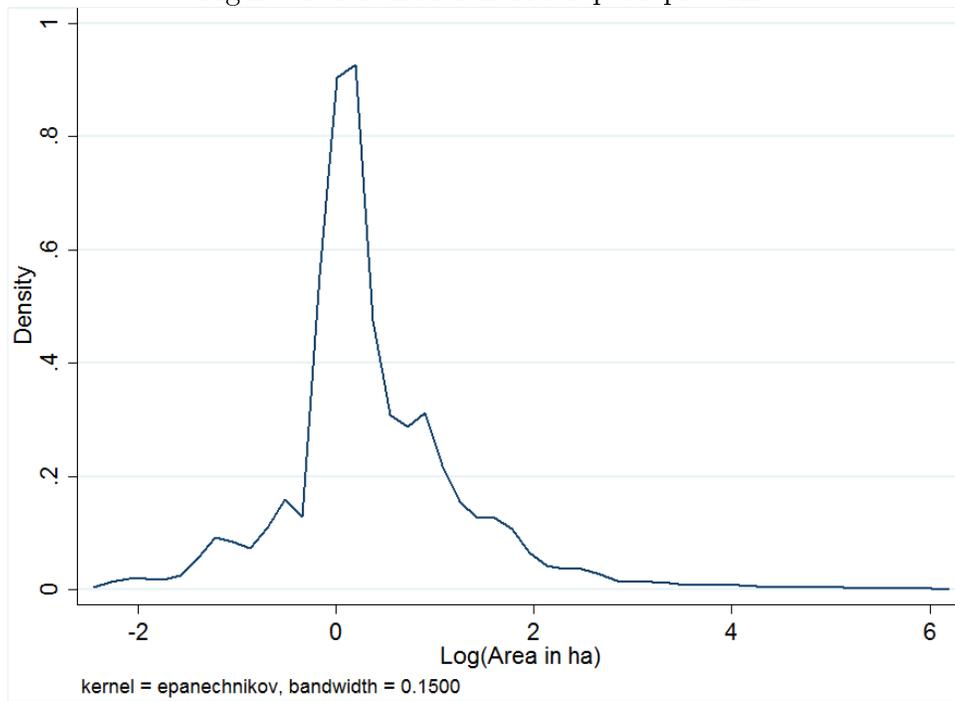


Figure 5: Stylized map of two announcements

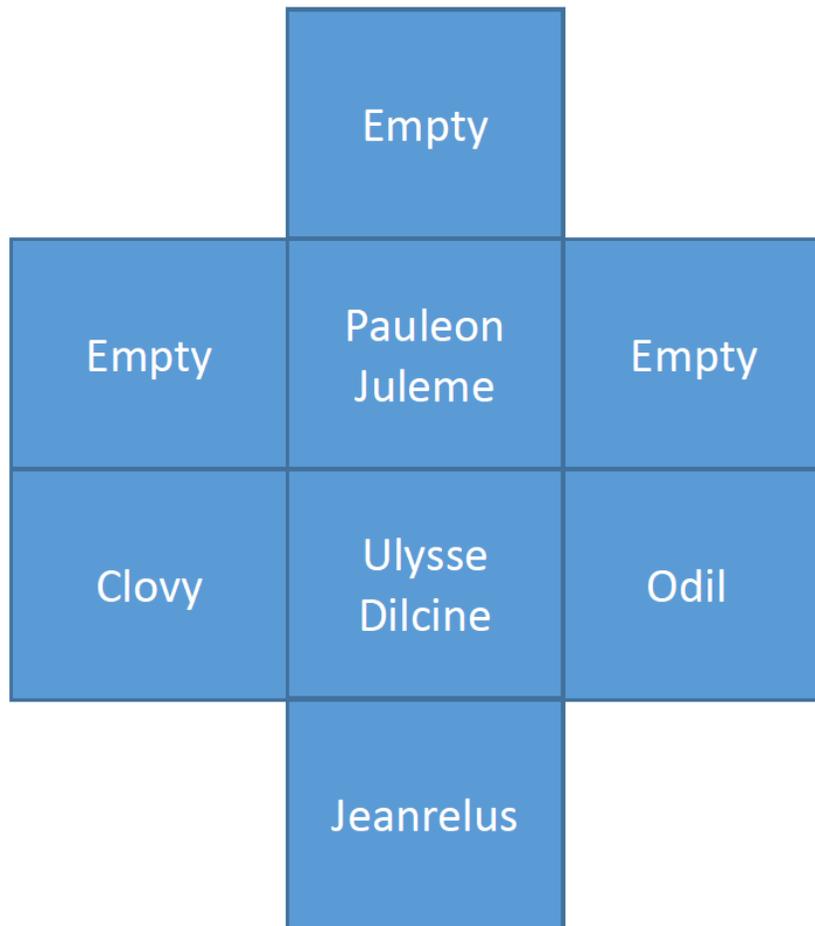


Figure 6: The effect of the Trujillo Massacre on rental plot requests



Figure 7: The effect of the Trujillo Massacre on rental plot requests



Figure 8: Monthly Requests for Land: May 1937-May 1938

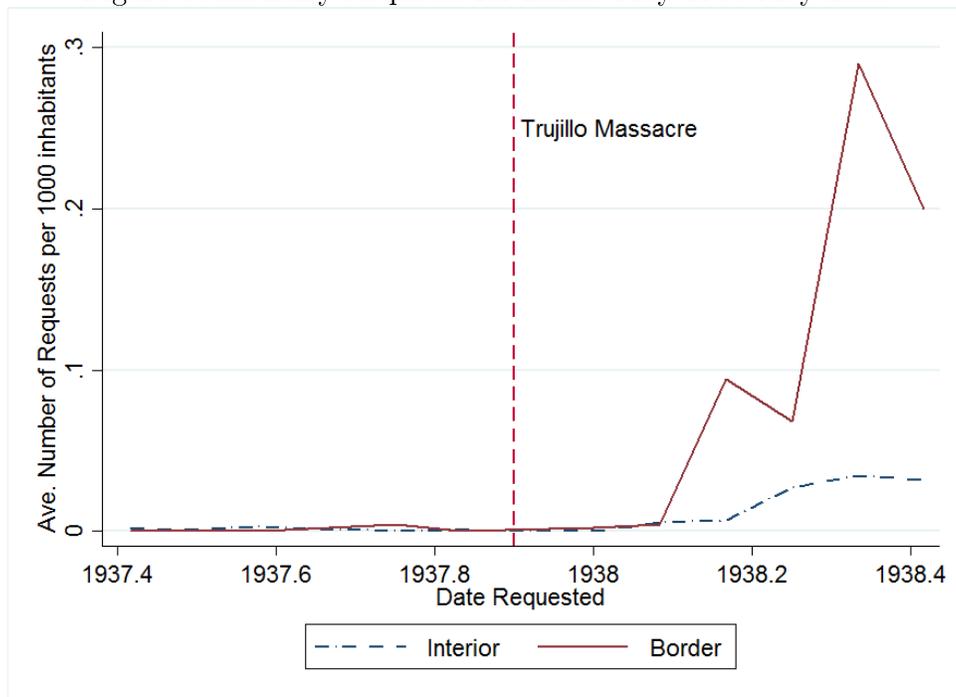
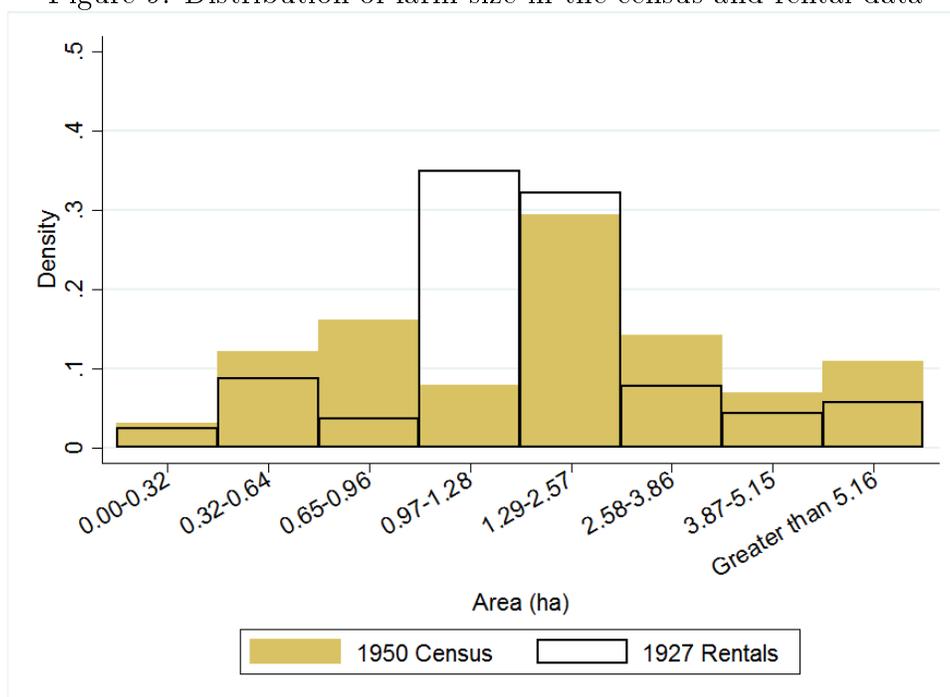


Figure 9: Distribution of farm size in the census and rental data



Notes: The rental data is all rentals requested in 1938 or later. The census data comes from the 1950 agricultural census. Only census tables were available, not microdata, and the bins reflect the numbers reported in the tables.